

# PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA220

## PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY  
(PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/RU2006/000216

International filing date (day/month/year)  
27.04.2006

Priority date (day/month/year)

International Patent Classification (IPC) or both national classification and IPC  
INV. H04L27/26 H04L1/00

Applicant  
INTEL CORPORATION

**1. This opinion contains indications relating to the following items:**

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

**2. FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA220.

**3. For further details, see notes to Form PCT/ISA220.**

Name and mailing address of the ISA:



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Date of completion of  
this opinion

see form  
PCT/ISA210

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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of:
  - ☒ the international application in the language in which it was filed
  - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ on paper
    - ☐ in electronic form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in electronic form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

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PCT/RU2006/000216

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1-28
Inventive step (IS)	Yes: Claims	
	No: Claims	1-28
Industrial applicability (IA)	Yes: Claims	1-28
	No: Claims	

2. Citations and explanations

**see separate sheet**

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**V. Reasoned Statement with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

I

The following documents cited in the International Search Report have been considered in this report:

D1: US 2005/195905 A1  
D2: EP-A-1 564 953

II

1. Document D1 discloses according to the essential features of Claim 1 (the corresponding features in D1 are given in brackets):

An apparatus (*figure 2*) comprising: a wireless station (*figure 2: "Data Receiver 202"*) operable in a wireless network (*page 1, par. [0005]: "OFDM wireless LAN systems"*) using an adaptive bitloading technique (*page 1, par. [0005]; page 2, par. [0020]*), wherein said wireless station is capable of using a predetermined limited set of modulation patterns (*figure 2: "ABL vector codebook" in block "207"; page 2, par. [0020]; page 3, par. [0025]: the receiver codebook contains a limited set of 'representation vectors' representing the received SNRs on all used carriers; ) to perform said ABL.*

D1 solves the problem of compression the modulation pattern to be reported by the wireless station by sending an index pointing to the nearest neighbour of a desired ABL vector within a given codebook (*see page 3, par. [0025]-[0028]*).

Consequently, the features of independent Claim 1 are already known from Document D1 and thus the subject-matter of Claim 1 is not novel. Claim 1 therefore does not meet the requirements of Articles 33(1) and (2) PCT.

2. The subject-matter of Claims 8, 15 and 22 corresponds in terms of method, machine-accessible medium and system features, respectively, to that of Claim 1. Therefore, the objections raised in the previous paragraph applies equally to Claims 8, 15 and 22 which do consequently not meet the requirements of Articles 33(1) and (2) PCT for lack of novelty.
3. It should be noted that even if the Applicant were to interpret Claims 1, 8, 15 and 22 in such a manner as to enable him to allege that its subject-matter were novel, based on minor differences between the features of these claims and those disclosed in D1, the subject-matter of Claims 1, 8, 15 and 22 would still not involve an inventive step, Articles 33(1) and (3) of the PCT, with respect to the disclosure of D1 especially as this document discloses the same object and the same type of solution as claimed in these claims.
4. The dependent claims do not appear at present to contain any feature which in combination with the subject-matter of the independent claim to which the respective dependent claim is appended would result in novel and inventive subject-matter, these additional features being either disclosed or rendered obvious by the above cited documents, or being minor details obvious to a person skilled in the art based on common general knowledge of the art (Article 33(1) PCT). In particular, it is noted:

Claims 2, 9, 16, 23: D1 teaches to use a codebook having a limited number of modulation patterns) for performing ABL compression (*see page 3, par. [0025]*). D1 further teaches to use a training set of simulated received SNR vectors to find the codebook that most appropriately represents the SNR vector distribution (*see page 3, par. [0030]*). The latter clearly also contain information on the channel's smoothness, i.e. the variation of the SNR profile during the simulated time;

Claims 3, 10, 17, 24: Using a limited set of allowed modulation patterns with respect to the theoretical maximum  $N_{\text{mod}}^{\text{NSC}}$  is implicit to the skilled person from what is mentioned in D1 (PCT-Guidelines, 12.04). The latter discloses ABL map compression using a vector-quantization-based technique (*see page 3, par. [0025]*) performing a nearest neighbour match, which implies to the skilled person that the number of allowable patterns must be reduced as otherwise no compression can be achieved when indexing the pattern set.

Also, the term "quantization" clearly implies a loss of resolution in terms of the number of allowable ABL patterns. Indeed, that is why only a "nearest neighbour" match and not a complete, i.e. a 100% match is performed;

Claims 4, 11, 18, 25: A-priori storage of the allowable modulation patterns is known from D1 in the form of two codebooks (*see fig.2: "off-line computation of codebooks"; page 2, par. [0020]*);

Claims 5, 12, 19, 26: Determining the best ABL pattern match for the current channel conditions at a receiving station and signalling back an index of the determined ABL pattern to a transmitting station is known from D1 (*see page 2, par. [0020]; page 3, par. [0025]-[0027]*);

Claims 6, 13, 20, 27: It is also known from D1 that the transmitting station uses the received index for retrieving the desired ABL pattern and to use said pattern during subsequent transmission (*see page 3, par. [0027]*);

Claims 7, 14, 21, 28: D1 teaches to search for a "nearest neighbour match" which corresponds to the "closest bitloading pattern" as claimed (*see page 2, par. [0020]; page 3, par. [0025]-[0026]*).

#### VII. Certain defects in the international application

1. To meet the requirements of Rule 6.3(b) PCT the independent claims should be cast in the two-part form, with those features known in combination from the prior art (see document D1) being placed in a preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in a characterising part (Rule 6.3(b)(ii) PCT).
2. To fulfil the requirements of Rule 5.1(a)(ii) PCT, documents D1 and D2 should be identified in the description and the relevant background art disclosed therein briefly discussed.
3. The opening part of the description should be brought into conformity with any amended

independent claims (Rule 5.1(a)(iii) PCT).

4. Furthermore, following the disclosure of document D1, the statement indicating the technical problem to be solved by the invention, requires revision, which should be effected taking the requirements of Rule 5.1(a)(iii) PCT into account.
5. Reference signs placed in parentheses should be inserted into all the claims to increase their intelligibility (Rule 6.2(b) PCT). This applies to both the preamble and the characterising portion.
6. The reference to the "spirit" of the invention should be deleted (see last line on page 10) (Article 6 PCT and PCT-Guidelines 5.30).
7. According to Rule 11.7(a) PCT, the drawing sheets should be numbered 1/3 to 3/3.
8. The wording of Claims 3, 10, 17 and 24 should be corrected: "... with NSC being is the number of subcarriers ...".

#### **VIII. Certain observations on the international application**

The following objections are raised with respect to Article 6 PCT:

1. The vague term "channel smoothness property" used in Claims 2, 9, 16 and 23 cannot be readily construed having regard to the specific technical features it seeks to define.
2. Claim 3 refers to a value  $N_{\text{mod}}$  which has no antecedent definition. The same objection applies to Claims 10, 17 and 24.
3. Claim 7 refers to the wireless station being capable of "developing" fast methods for searching a closest bitloading pattern.

The reader is left in doubt as to which specific technical method steps are effectively being implemented by the wireless station. As presently formulated, the latter is solely

defined by its desired function of finding fast search methods, which however is not sufficient to clearly define the matter for which protection is sought (cf. PCT-Guidelines, 5.35).

The same objection applies to Claims 14, 21 and 28.

4. The formulation in machine-accessible medium Claims 16 to 21 "further comprising said instructions causing said machine to perform operations further comprising ..." cannot be readily construed.

It is unclear whether the instructions defined in independent Claim 15 perform the further operations as defined in Claims 16-21 or whether the latter claims seek protection for further instructions destined for these operations.

It is suggested for clarification to replace Claims 15-21 by a single claim reading: "A machine-accessible medium comprising instructions, which when accessed, cause a machine to perform the method according to any one of Claims 8 to 14."